NATURAL RESOURCES CONSERVATION SERVICE

VEGETATIVE BARRIERS (FEET)

CODE 601

MONTANA CONSERVATION PRACTICE SPECIFICATION

DEFINITION: Permanent strips of stiff, dense vegetation along the general contour of slopes or across concentrated flow areas.

PURPOSE: As part of a resource management system, vegetative barriers will support practices that reduce sheet and rill erosion, ephemeral gully erosion, manage water flow, stabilize steep slopes, and trap sediment.

Resource Management System.: Vegetative barriers are established as part of a resource management system to address the soil, water, air, plant, animal, and human needs as related to the owner's goals and objectives. It is important to consider crop rotation, nutrient and pest management, and other supportive conservation practices when designing a water erosion reduction system.

BACKGROUND: This practice can be used on areas eroding by water erosion including cropland, pastureland, rangeland, forestland, farmsteads, mined land, and construction sites. This practice will typically not resolve water erosion problems by itself, but must be used in conjunction with other practices such as residue management, conservation tillage, crop rotation, strip cropping, etc.

When designing a water erosion reduction system, predicted soil losses using the design system must be less than or meet the tolerable level established for the design soil map unit.

DESIGN:

For All Purposes. Vegetation utilized in this practice must be strong enough to withstand the flow of water without breaking during runoff events. The ability of a plant to withstand breaking is measured by the Vegetative Stiffness index (VSI). Stiffness of the plant can be estimated by measuring the diameter of the stem at a point 6 inches above the ground. The larger the diameter of the stem the fewer plants required per square foot. Where water flows in a concentrated pattern, the density of plants must be doubled compared to non-concentrated flow areas. By the end of the first growing season plants must be growing no more than three inches apart for optimum effects.

Species selected must adapt to local climatic and geographic characteristics. Selected species that are long-lived, easy to establish, and manageable. Species should also be able to emerge and thrive when covered by several inches of sediment. For best results species should be rhizomatous or stoloniferous and remain erect year around. Also consider selecting species that are not invasive.

ESTABLISHMENT: Barriers may be established vegetatively or from seed. When established from seed, proper seedbed preparation is necessary. The following general guidelines should be followed as a minimum to ensure success germination. Additional methods, based on site specific conditions, may be necessary.

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SEEDBED PREPARATION: Provide a firm, weed-free seedbed that:

- ensures seed will contact soil moisture uniformly (seed to soil contact).
- facilitates seedling emergence.
- provides a medium that does not restrict or allow roots to become dry.
- eliminates seedling competition from weedy species.
- provides a seedbed that is sufficiently firm
  when an average sized man sinks 1/8 to 1/4 inch into the soil.

Barriers established vegetatively will be planted in a single row formation. Typically, this requires a spacing of no more than 6 inches for bare root stock, cuttings, sod chunks, plugs, rhizomes, or divisions of no fewer than 5 stems. Suckering shrubs or herbaceous material established from 6-inch pots will be planted at a spacing of no more than 12 inches.

BARRIER WIDTHS: Barrier widths will be the larger of 3 feet wide or .75 X the design vertical height of the planted species. Drilled or broadcast seed will be sown in a strip no less than 3 feet wide. Row planted seed will be seeded in a minimum of two rows.

ADDITIONAL DESIGN CRITERIA FOR SHEET AND RILL EROSION CONCERNS.

Slope Gradient. To minimize sheet and rill erosion, slope along the barrier will be no less than 0.2 percent and no greater than 1.0 percent except when the barrier crosses a concentrated flow area. In concentrated flow areas, the gradient may be 1.5 percent for up to 100 feet to better align barriers.

All tillage operations between barrier intervals should be parallel to the barriers. To be able to redirect flow a **berm** must exist at the upslope edge of the barrier and/or a channel must exist immediately upslope of the barrier. This berm or channel may develop naturally or from tillage operations. However, to expedite proper functioning of the barrier, the berm or channel may be constructed. The berm height or channel depth should be 3 inches high.

Horizontal Spacing. A vertical interval of no more than 6 feet, or the allowable "L" that achieves soil loss tolerance in RUSLE considering the planned conservation management system (including all practices such as residue management, contouring, strip cropping, etc.).

Vegetation. The vegetation will be species that provide minimum stem diameter and stem density equal to a VSI of 0.05.

ADDITIONAL DESIGN CRITERIA FOR REDUCING GULLEY EROSION.

Alignment. When a particular field is excessively undulating, establishing barriers on the contour across a concentrated flow area is difficult. In these cases, barriers may be established at angles convenient for the operation of farm equipment. Vegetative barriers will not need to be established across the top of ridges where water does not flow into the vegetative barrier.

Width and Length. Vegetative barriers will consist of a minimum of two rows. Each barrier will extend (length) far enough to provide 1.5 feet of elevation from the center of the flow area to the end of the barrier so that water cannot flow around the barrier causing additional erosion.

Spacing. Spacing between vegetative barriers will be based on the vertical interval of 1.5 feet for conditions where no tillage is performed between barriers and 3 feet for all other conditions.

Minimum Level Bottom Section Length. The minimum level bottom section length (ft) shall be numerically equal to the peak discharge (in cfs) for a 2-year 24 hour storm from the total watershed upslope of the vegetative barrier. The level bottom section is defined as the bottom width of a trapezoidal waterway.

Vegetation. The vegetation will be species that provide minimum stem diameter and stem density equal to a VSI of 0.10.

ADDITIONAL DESIGN CRITERIA FOR MANAGING WATER FLOW.

Gradients along the barrier will be no less than 0.2 percent any greater than 1.0 percent with the exception of where the barrier crosses a concentrated flow area. Gradients entering a concentrated flow area may be up to 1.5 percent for 100 feet in order to get better row alignment.

A berm must exist at the upslope edge of the barrier and/or a channel must exist immediately upslope of the barrier. The berm height/channel depth must be 3 inches. These berm/channels may be created by normal tillage parallel to the vegetative barrier, but need to be preformed in no-till situations.

Width and Length. Vegetative barriers will consist of 1 or 2 rows. Vegetative barriers may be wider to adjust for planter or sprayer equipment or for better contour alignment. Each barrier will extend (length) far enough to provide 1.5 feet of elevation from the center of the flow area to the end of the barrier so that water cannot flow around the barrier causing additional erosion.

Spacing. Horizontal spacing between the vegetative barriers intended to redirect runoff will be determined using the lessor of (a) a vertical interval of no more than 6 feet , or (b) the allowable “L” that achieves soil loss tolerance in RUSLE considering the conservation management system.

For barriers intended to retard and spread run-on, the maximum vertical interval will be 1 foot.

Crop strip width will be planned in multiples of widths of planting, tillage, spraying, and harvest equipment. Spacing may be adjusted up to 10 percent between the barriers to accommodate for equipment widths.

Maximum Watershed. The total watershed size in a vegetative barrier system must be the smaller of (a) the size that will provide runoff to impound 1 foot of water upslope of the lowest barrier in the system, or (b) the size that will generate velocities greater than allowable on bare soil for the soil texture in the concentrated flow area. (See Engineering Field Handbook, Chapter 7)

Vegetation. The vegetation will be species that provide the minimum stem diameter and stem density equal to a VSI of 0.05 for areas diverting runoff and VSI of 0.1 for areas retarding and ponding runoff.

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ADDITIONAL DESIGN CRITERIA FOR STABILIZING STEEP SLOPES.

Concentrated flow channels are not acceptable on steep slope faces.

Alignment. The barrier will be installed on the contour. If overland flow is expected down the slope face, the barrier alignment may deviate from the contour up to a grade of 2% to divert water.

Spacing. Horizontal spacing between the vegetative barriers will be the spacing that results in a vertical interval of no more than 6 feet. If overland flow is expected, the vertical interval of barriers should be no greater than 4 feet.

Vegetation. The vegetation will be a deeply rooted species that establishes easily and grows rapidly. The vegetative stiffness shall provide the minimum stem diameter and stem density equal to a VSI of 0.05.

Maximum Watershed: No maximum watershed is given. However, if concentrated flow occurs on the steep slope, mitigation practices, such as a terrace or diversion, must be installed to eliminate the concentrated flow.

OPERATION AND MAINTENANCE.

Maintenance must be carried out to insure that this practice functions as intended. These actions include normal activities in the application and use of the practice and repair and maintenance of the practice.

1. Establishment failures will be replanted or reseeded immediately, short gaps in seeded barriers may be reestablished more effectively and immediately with transplanted plant material.
2. Mowing of herbaceous barriers may be used as a management practice to encourage the development of a dense stand and prevent shading of crops in adjacent fields. Mowing will not be **less** than 15 inches or the recommended height for the species, whichever is taller. Mowing will be scheduled to coincide with access through crops in adjacent fields. Mowing in concentrated flow areas is discouraged because it will lower the vegetative stiffness index (VSI) by reducing average stem diameter.
3. Burning of herbaceous barriers may be used as a management practice, based on a case by case analysis, to encourage the development of a dense stand and prevent the accumulation of residue in the barrier. Burning will be performed when the vegetation is dormant and with adequate supervision to prevent the fire from damaging surrounding areas. A controlled burn plan will be required.
4. Weed control will be accomplished by mowing or by spraying or wick application of labeled herbicides.
5. Vegetation in the barrier will be tolerant to or protected from herbicide used in the cropped field.
6. Crop tillage and planting operations will be parallel with the vegetative barrier.
7. Pest control in adjacent fields will be performed with techniques and pesticides that will not damage the vegetative barrier.
8. Washouts or rills that develop will be filled and replanted immediately. Short gaps in established barriers will be reestablished with transplanted plant material.
9. Vegetative barriers will not be used as a field road or turn row. Vegetative barriers in concentrated flow areas will not be crossed with machinery.
10. Vegetative barriers will not be crossed with water furrow plows or similar implements to cut drainage ditches to allow the passage of surface and subsurface water. If necessary, water will be drained with underground outlets installed upgradient of the barrier.